for this reason we think Italian men of science are well advised to insist upon the recognition of the services of their famous countryman, and they may be assured that all who value solid work diligently performed will give a grateful thought to the unostentatious astronomer of Palermo, who devoted himself with skill and patience to the laborious, and perhaps unappreciated, work of cataloguing the stars. W. E. P.

SYNTONIC WIRELESS TELEGRAPHY.

MR. MARCONI'S lecture on "Syntonic Wireless Telegraphy," recently delivered before the Society of Arts, gives an admirable and most interesting description of the system which he has developed and of the steps by which the development has been effected. "I have come to the conclusion," said Mr. Marconi, "that

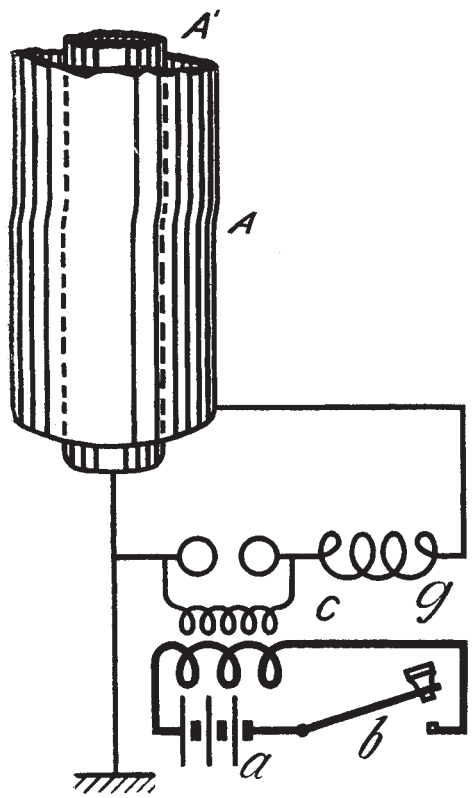

FIG. 1.

the days of the non-tuned system are numbered." If this prophecy be correct the non-tuned system has had, as was indeed expected, but a short life; but even in the few years that it has been in use it has accomplished much, having already to a certain extent greatly increased the pleasure and, above all, the safety of travelling by sea. There can be no better evidence of the general utility of wireless telegraphy than that the time has already arrived when the imperfections of the untuned system are making themselves felt. To quote Mr. Marconi again, "The ether about the English Channel has become exceedingly lively, and a non-tuned receiver keeps picking up messages from various sources which very often render unreadable the message one is trying to receive." That this confusion of messages would sooner or later occur many prophesied in the early days of the art, but few, we think, seriously believed that it would come about so soon. Fortunately, now that the evil is beginning to be felt, Mr. Marconi is ready with the remedy, a well-worked-out and trustworthy system of tuned transmitters and receivers.

The original form of Mr. Marconi's transmitting arrangement is too well known to need illustration: it consisted of an induction coil the secondary terminals of which were connected to a spark gap between two brass balls, one of these being earthed and the other connected to a long aërial conductor. Such a transmitter has a very low electrical capacity, and its radiating power is comparatively great. As a result, the oscillations which take place are considerably damped, and all the energy is radiated in one or two strong swings. Any receiving apparatus in the neighbourhood which is sufficiently sensitive will respond to these radiations even although its natural time of vibration differs greatly from that of the transmitter. Selection of messages with this arrangement is possible, to a limited extent, by using aërial conductors of considerably different lengths and

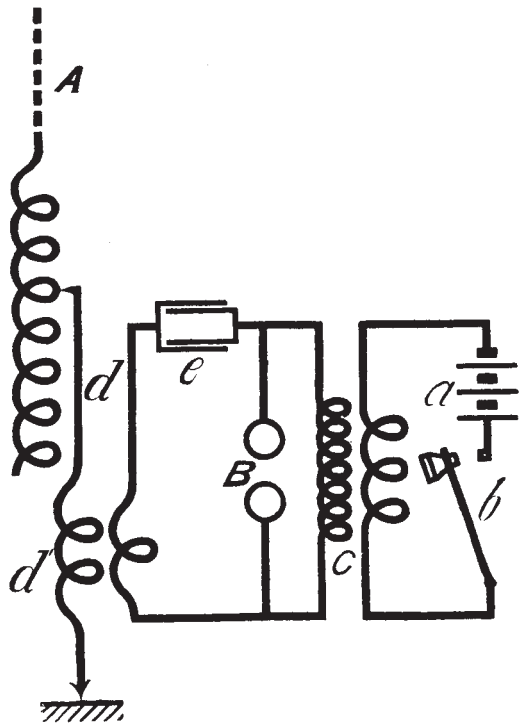

FIG. 2.

by winding the induction coils on the receiving apparatus with the length of wire necessary for correct resonance. But although this answers when the two or more transmitting stations are at different distances from the receiving station, it has been found not to work satisfactorily when the distances are equal.

It is necessary, therefore, to employ some form of radiator in which the oscillations are less damped and which will therefore emit a train of waves instead of one or two strong vibrations. These feebler impulses, falling in succession upon a receiver having the same time of vibration, will get up a swing sufficiently strong to break down the high resistance of the coherer. If, however, the receiver is not in tune, the impulses will not tend to get up any swing, and, being individually too feeble to break down the coherer's resistance, no signal will be recorded. Such a radiator can be constructed as shown in Fig. 1, in which the aërial conductor takes the form of two concentric cylinders, the inner, A', being connected to earth and to one side of the spark gap, and the outer,

A, being connected through an inductance, *g*, to the other side of the spark gap. Mr. Marconi finds it essential that the inductance of the two conductors A and A′ should be unequal, the larger inductance being preferably joined to the non-earthed conductor A. Such an arrangement proves both a persistent vibrator and a good radiator, thus enabling selective signalling to be easily carried on over considerable distances with quite short heights of cylinder. Very good results were obtained between the Isle of Wight and Poole, a distance of three miles, with cylinders 1·5 metres in diameter and only 7 metres high.

Another very good syntonised transmitting and receiving system which has been devised by Mr. Marconi is shown in Figs. 2 and 3.

In this the terminals of the spark gap, B, are connected to a closed circuit containing inductance and capacity; such a circuit is a very persistent oscillator, but a bad

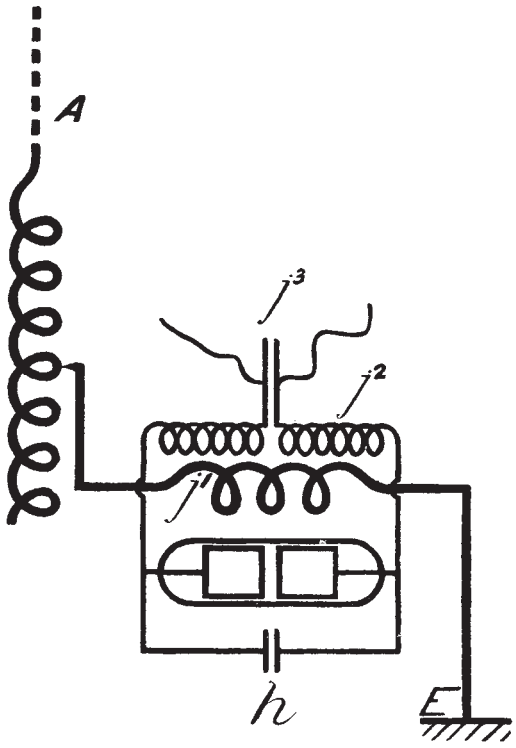

FIG. 3.

radiator and absorber. There is, therefore, combined with it a good radiating circuit, consisting of the vertical conductor, A, which is earthed through an adjustable inductance, *d*. The vibrations set up in the primary circuit connected to the spark gap induce oscillations in the radiating circuit, the mutual action being increased by winding a part of the radiating circuit around the primary circuit (at *d*′), as in a transformer. The two circuits are carefully tuned by adjusting either the capacity, *e*, or the inductance, *d*, or both. In the receiving apparatus (Fig. 3) the connections are similar; the aërial wire is connected to earth through an adjustable inductance, part of which, j^1, is wound as the primary of a transformer of which the secondary, j^2, is connected to the coherer; an adjustable capacity, *h*, is connected across the coherer in order to obtain better tuning. It will be seen that with this arrangement of transmitting and receiving stations there are four distinct circuits, two at each station, which have all to be in tune. Using this system Mr. Marconi has been able to attain very satisfactory syntony even although the same vertical wire be used for the different sets of signalling apparatus, which would be connected to it, in such a case, through inductances of different values.

A still further improvement is effected by combining the two methods described above; in this case the connections are made as shown in Fig. 4, which does not require any further explanation.

Mr. Marconi concluded his lecture with an account of some of the achievements already made with wireless telegraphy. The development has been so rapid under his able guidance that one feels that almost as one writes the systems being described are becoming out of date. Perhaps before long Mr. Marconi will have succeeded, by the use of suitable mirrors and lenses, in guiding the radiation in a definite direction, and thus

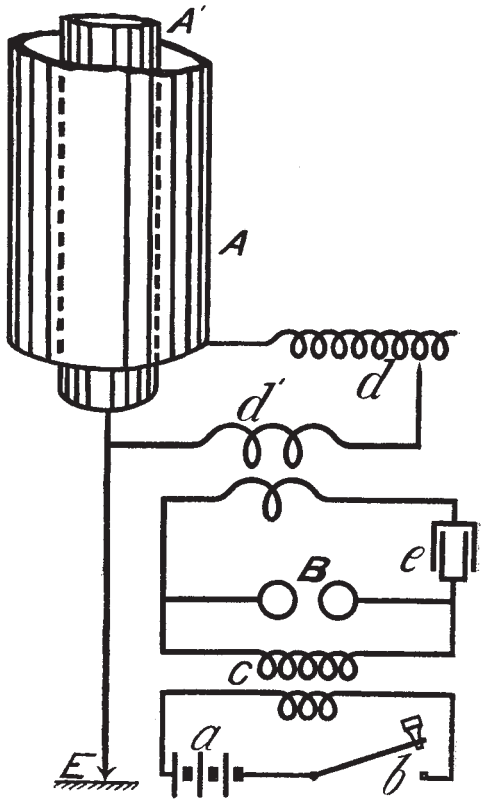

FIG. 4.

have effected a great gain in efficiency. But whether this should prove practicable or not, Mr. Marconi is to be congratulated on the brilliant success of his efforts, and deserves the gratitude of all for having worked out so admirable a system for increasing the safety and convenience of those "that go down to the sea in ships, that do business in great waters."

THE ANTARCTIC EXPEDITION.

TO our great regret the officers of the Royal Society have not yet, so far as we know, made any statement regarding the hopeless condition of affairs which has arisen in relation to the Antarctic Expedition in consequence of the recent action of the Council.

It will be of interest to our readers to observe, in the paragraph we quote below, from *Science* of May 24, the manner in which the management of the Antarctic Expedition is regarded by the scientific men of another